COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S2-ME-PT-210**
	part-time programme:	
Course title in Polish	**Wirtualne prototypowanie maszyn i urządzeń**	
Course title in English	**Virtual Prototyping in Machine Design**	
Valid from (academic year)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**second-cycle**
Type of education	**academic**
Mode of study	**full-time programme**
Specialism	**Design and Manufacturing**
Department responsible	**Department of Machine Design and Machining**
Course leader	**dr inż. Łukasz Nowakowski**
Approved by	**dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering**

COURSE OVERVIEW

Course type		**specialism-related**
Course status		**compulsory**
Language of instruction		**English**
Semester of delivery	full-time programme	**Semester II**
	part-time programme	**Semester II**
Pre-requisites		**-**
Examination required (YES/NO)		**NO**
ECTS value		**2**

Mode of instruction		**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	full-time programme	**15**			**15**	
	part-time programme					

LEARNING OUTCOMES

Category of outcome	**Outcome code**	**Course learning outcomes**	**Corresponding programme outcome code**

Knowledge	W01	The student has detailed and in-depth knowledge of the creation and analysis of technical documentation from virtual prototyping and simulation of machinery and equipment using CAD programmes.	MiBM2_W06
	W02	The student has a solid and in-depth knowledge of CAD systems and is familiar with CAD programs. The student has detailed and theoretically based knowledge related to selected topics in mechanical engineering and virtual prototyping and simulation of machines and devices.	MiBM2_W07 MiBM2_W12
Skills	U01	The student is able to prepare technical documentation concerning the developed virtual prototype and simulation of the operation of a machine or device. He/she is able to analyse and synthesise the results obtained.	MiBM2_U04
	U02	Can virtually, according to specifications, design a prototype of an entire device or mechanical system using computer aided machine design. Can select and apply an appropriate method and tools to solve a complex engineering task of a practical nature in design, construction, prototyping.	MiBM2_U08
	U03	Can quickly and accurately identify and diagnose an engineering problem and propose innovative methods to solve it, critically analysing the way it works and evaluating existing technical solutions, equipment, facilities, systems, processes and services in the field of mechanics and mechanical engineering.	MiBM2_U09
Competence	K01	The student is ready to think and act in an entrepreneurial manner and is prepared to take optimal organizational measures in the virtual prototyping of machines and equipment using CAD programs.	MiBM2_K03

COURSE CONTENT

Mode of instruction	Topics covered
lecture	The lecture course provides design information for building conceptual models that combine mechanical, electrical, and software components while considering system-level product requirements. Students will be introduced to the capabilities of CAD programs for early conceptual design in mechanical, electrical and automation design and engineering. Students will be introduced to the product development process from rough to detailed. Students will be introduced to the process of virtual commissioning of machines and equipment using motors, other actuators and sensors.
project	As part of the design course, projects are conducted to introduce students to virtual prototyping techniques for machinery and equipment using CAD software. The scope of the design classes will include comprehensive development of designs in CAD software based on the available virtual prototyping capabilities and simulation of the operation of the designed machines and equipment.

ASSESSMENT METHODS

Outcome code	Methods of assessment					
	Oral examination	Written examination	Test	Project	Report	Other

W01			X			
W02			X			
U01				X		
U02				X		
U03				X		
K01						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	non-examination assessment	Successful completion of the final colloquium. Receive at least 50% of the grade.
project	non-examination assessment	Successful completion of projects developed in class. The final grade will be the arithmetic average.

OVERALL STUDENT WORKLOAD

ECTS weighting												
No.	Activity type	Student workload										Unit
		full-time programme					part-time programme					
		L	C	Lb	P	S	L	C	Lb	P	S	
1.	Scheduled contact hours	**15**			**15**							h
2.	Other contact hours (office hours, examination)	**2**			**2**							h
3.	**Total number of contact hours**	**34**										h
4.	**Number of ECTS credits for contact hours**	**1,4**										ECTS
5.	**Number of independent study hours**	**16**										h
6.	**Number of ECTS credits for independent study hours**	**0,6**										ECTS
7.	**Number of practical hours**	**25**										h
8.	**Number of ECTS credits for practical hours**	**1,0**										ECTS
9.	**Total study time**	**50**										h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**2**										ECTS

READING LIST

1. Mazur D., Rudy M.: Modelowanie w systemie NX CAD. Oficyna Wydawnicza Politechniki Rzeszowskie Rzeszów 2016
2. Antosiewicz M.: Modelowanie powierzchniowe, Tom I. Wydawnictwo CAMdivision, Rzeszów 2022.
3. Antosiewicz M.: Modelowanie powierzchniowe, Tom II. Wydawnictwo CAMdivision, Rzeszów 2022.
4. Jóźwiak D., Antosiewicz M.: Podstawy modelowania Synchronous & Realize Shape, Wydawnictwo CAMdivision, Miękkinia 2015.
5. Randy H. Shih, Parametric Modeling with Siemens NX, 2023
6. Sham Tickoo, Siemens NX 2023 for Designers 2023